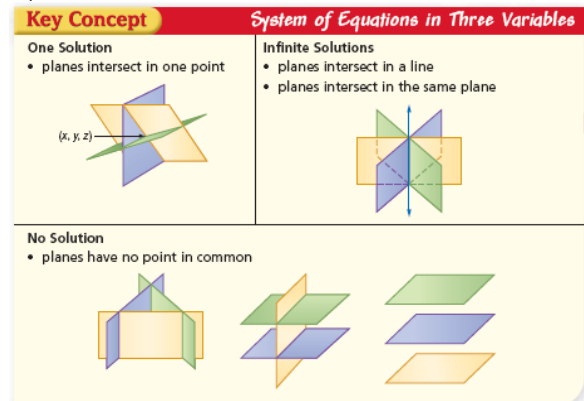


3-5 Solving Systems of Equations in 3 Variables

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Consistent (at least one solution)

- ordered triple
- line
- plane

Inconsistent (no solution)

True statement

∞ # of solutions (could be a plane or line)

False statement

no solution

ex 1

① $2x - y - z = 1$

② $x + 2y + z = 0$

③ $3x - y - 2z = -1$

Add ① + ②

$$\begin{array}{r} 3x + y = 1 \\ y = 1 - 3x \end{array}$$

2x(②) + ③ eliminate z from ③

$$\begin{array}{r} 2x + 4y + 2z = 0 \\ 3x - y - 2z = -1 \\ \hline 5x + 3y = -1 \end{array}$$

⑤ $5x + 3(1 - 3x) = -1$

$$\begin{array}{r} 5x + 3 - 9x = -1 \\ -4x = -4 \\ x = 1 \end{array}$$

$(1, -2, 3)$

ex 2

① $2x + y - 2z = -2$

② $-x - 3y - 2z = 5$

③ $-4x - 2y + 3z = 2$

① × 2 + ③

$$\begin{array}{r} 4x + 2y - 4z = -4 \\ -4x - 2y + 3z = 2 \\ \hline -z = -2 \\ z = 2 \end{array}$$

$(3, -4, 2)$

① + 2(②)

$$\begin{array}{r} 2x + y - 2z = -2 \\ -2x - 6y - 4z = 10 \\ \hline -5y - 6z = 8 \end{array}$$

$\therefore -5y - 6(2) = 8$

$$y = -4$$

Do:

① $2x + y + z = 0$

② $x - 2y + z = 2$

③ $3x - y + 2z = 2$

① + ③

$$5x + 3z = 2$$

∞ # sol'ns

2x(①) + ②

$$\begin{array}{r} 4x + 2y + 2z = 0 \\ x - 2y + z = 2 \\ \hline 5x + 3z = 2 \end{array}$$

ex 3:

① $x - 3y + 4z = 10$

② $2x - y - z = 7$

③ $x - 4y = 1$

4x(②) + ①

$$\begin{array}{r} x - 3y + 4z = 10 \\ 8x - 4y - 4z = 28 \\ \hline 9x - 7y = 38 \end{array}$$

$(5, 1, 2)$

Solve ③ + ④

$x = 1 + 4y$

$$\begin{array}{r} 9(1 + 4y) - 7y = 38 \\ 9 + 36y - 7y = 38 \\ 29y = 29 \\ y = 1 \end{array}$$

HW

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12, 16, 17, 19, 20